

# **Spot Safety Project Evaluation**

Project Log # 200703107

Spot Safety Project # 06-01-202

## **Spot Safety Project Evaluation of the Guardrail Installation On SR 1720 / SR 1758 (Rico Road) at Bridge No. 231 Bladen / Columbus County Line**

Documents Prepared By:

Safety Evaluation Group  
Traffic Safety Systems Management Section  
Traffic Engineering and Safety Systems Branch  
North Carolina Department of Transportation

**Principal Investigator**

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Jason B. Schronce

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Date

Traffic Safety Project Engineer

## ***Spot Safety Project Evaluation Documentation***

### **Subject Location**

Evaluation of Spot Safety Project Number 06-01-202 – SR 1720 / SR 1758 (Rico Road) at Bridge Number 231 over Slade Swamp on the Bladen and Columbus County Line.

### **Project Information and Background from the Project File Folder**

The spot safety project improvement countermeasure chosen for the subject location was the installation of w-beam guardrail around the existing concrete bridge railing. SR 1720 (Rico Rd) in Columbus County and SR 1758 (Rico Rd) in Bladen County is a two-lane, two-way facility at the subject bridge location with a non-posted rural speed limit of 55 mph and a 25 mph curve advisory speed posted. The guardrail was installed around Bridge No. 231 which crosses Slade Swamp and is the county boundary line between Bladen and Columbus Counties.

The original statement of problem was that motorists were losing control exiting the sharp northbound horizontal curve and striking the existing bridge rail or running off the road and into the swamp. This location is located in a rural environment surrounded by farmland, trees, and swamp conditions.

The initial crash analysis was completed from October 31, 1997 to October 31, 2000 with four (4) reported crashes, including a fatality and a B-class injury. The final completion date for the improvement at the subject location was on June 1, 2002 with a total cost of \$25,000.00.

### **Naive Before and After Analysis**

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from May 1 to June 30, 2002. The before period consisted of reported crashes from July 1, 1997 through April 30, 2002 (4 years and 10 months) while the after period consisted of reported crashes from July 1, 2002 through April 30, 2007 (4 years and 10 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis.

The treatment data consisted of all crashes within 500 feet of the subject bridge location which includes the intersection of SR 1720 and SR 1702 in Columbus County. *Please see attached location map and photos for further details.* The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Ran-off Roadway Crashes were the target crashes for the applied countermeasure.

<u>Treatment Information</u>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total and Target crashes	7	3	- 57.14 %
Total and Target Severity Index	13.94	5.93	- 57.46 %
Swamp Entering / Guardrail Strike	6	1	- 83.33 %
Volume	880	940	6.82 %
<b><u>Injury Crash Summary - Overall</u></b>			
Fatal injury Crashes	1	0	- 100.00 %
Class A injury Crashes	0	0	N/A
Class B injury Crashes	2	1	- 50.00 %
Class C Injury Crashes	0	1	100.00 %
Total Injury Crashes	3	2	- 33.33 %

The naive before and after analysis at the treatment location resulted in a 57 percent decrease in Total Crashes, in Target Crashes, and in the Overall Severity Index. The before period ADT year was 1999 and the after period ADT year was 2004.

## Results and Discussion

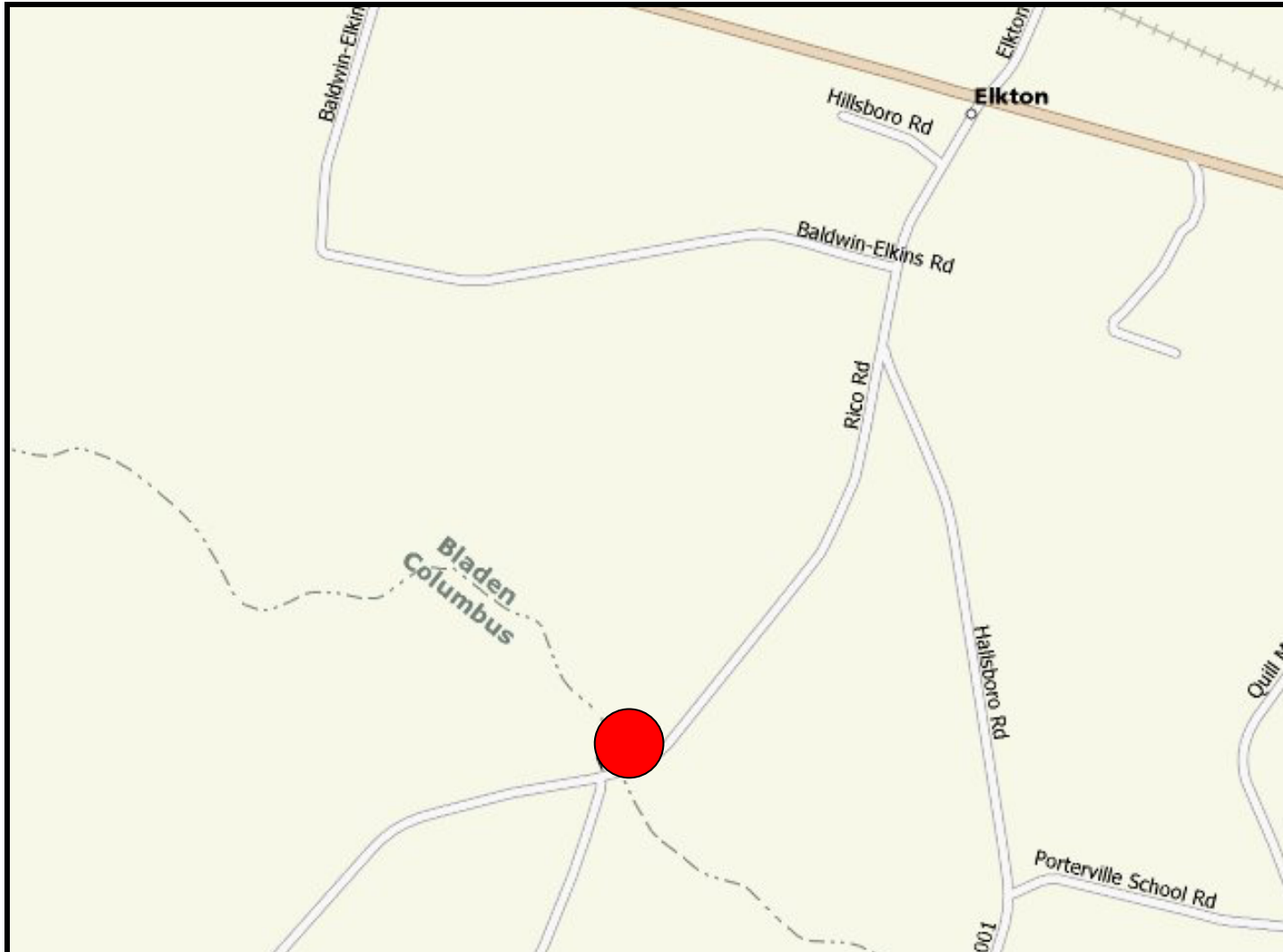
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 57 percent decrease in both Total Crashes and in Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, six of the seven ran-off roadway accidents in the before period would have struck the installed guardrail. After the guardrail installation, the target crash pattern was significantly reduced to three (3), of which only one (1) stuck the guardrail. It is a reasonable conclusion that the use of reflective devices on the guardrail including chevrons has alerted motorists to the sharp northbound horizontal curve in effect reducing the number of ran-off roadway collisions.

The calculated benefit to cost ratio for this project is 26.65 considering total and/or target crashes. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Please see the attached *Treatment Site Photos*. Photos are provided for both approaches to the bridge location including photos showing the curve advisories from each direction. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

**Location Map**  
**Bladen / Columbus County Line**  
**Evaluation of Spot Safety Project # 06-01-202**



**Treatment Location: SR 1720 / SR 1758 (Rico Road) at Bridge No. 231**

**TREATMENT SITE PHOTOS TAKEN 4/8/2008**



Traveling North on SR 1720 (Rico Rd) in Columbus County



Traveling North on Rico Rd





Traveling North on Rico Road



Traveling South on SR 1758 (Rico Rd) in Bladen County



Traveling South on Rico Road



Traveling South on Rico Road

# BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: Rico Road at Bridge 231  
COUNTY: Bladen / Columbus  
FILE NO.: SS 06-01-202

BY: JBS  
DATE: 4/10/2008  
NOTES: Total and Target Crashes

DETAILED COST: TYPE IMPROVEMENT - Guardrail around Bridge Railing

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$25,000	10	0.149	\$3,726
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$25,000	10	0.149	\$3,726
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ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$249
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$0
TOTAL ANNUAL COST=	\$3,975
TOTAL COST OF PROJECT=	\$25,000

## COMPREHENSIVE COST REDUCTION:

### ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.83	1	0.21	2	0.41	4	0.83	\$114,203
AFTER	4.83	0	0.00	2	0.41	1	0.21	\$8,261

Annual Benefits from Crash Cost Savings \$105,942

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$101,967

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 26.65

TOTAL COST OF PROJECT - \$25,000 COMPREHENSIVE B/C RATIO - 26.65



SS# 06-01-202  
Bladen & Columbus Co.  
SR 1720 / SR 1758  
Before Period  
7/1/97 - 4/30/02

Before Period Conditions:  
Concrete Bridge Railing but  
no surrounding guardrail

LEGEND

MOVING VEHICLE

PEDESTRIAN

PARKED VEHICLE

PARKING VEHICLE

FIXED OBJECT

HEAD ON

REAR END

RAN OFF ROAD

ANGLE

TURNING

BACKING

SIDESWIPE

OUT OF CONTROL

INJURY

FATALITY

9 MPH OR LESS

10 MPH TO 19

20 MPH TO 29

30 MPH TO 39

40 MPH TO 49

50 MPH TO 59

60 MPH TO 69

70 AND UP

SPEED UNKNOWN

P PEDESTRIAN

T TRAIN

• DRIVER AT FAULT

D DRY

W WET

I ICY OR SNOWY

O OILY

Slade Swamp  
Bridge No. 231  
County Boundry

Bladen County  
SR 1758  
Rico Road  
55 MPH

# Target Crashes

SR 1702

Columbus County  
SR 1720  
Rico Road  
55 MPH

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

HIGHWAY SAFETY  
PLANNING AND  
ANALYSIS

HIGHWAY SAFETY  
IMPROVEMENT  
PROGRAM

HIGHWAY  
SAFETY  
MANAGEMENT

RAILROAD-HIGHWAY  
SAFETY MANAGEMENT

COLLISION DIAGRAM

DIVISION: 6

AREA: 2

STUDY PERIOD: 7/1/1997 TO 4/30/2002

DISTANCE: Y-LINE = 500FT bridge

ANALYSIS PREPARED BY: T. Finn

ANALYSIS CHECKED BY: J. Schronce

DIAGRAM PREPARED BY: J. Schronce

DIAGRAM REVIEWED BY: ST

SCALE: NOT TO SCALE

DATE: 9-26-2007

LOG NUMBER: SS# 06-01-202

N.C. DEPARTMENT of TRANSPORTATION

DIVISION of HIGHWAYS

TRAFFIC ENGINEERING AND SAFETY  
SYSTEMS BRANCH

SS# 06-01-202  
Bladen & Columbus Co.  
SR 1720 / SR 1758  
After Period  
7/1/02 - 4/30/07

LEGEND

MOVING VEHICLE

PEDESTRIAN

PARKED VEHICLE

PARKING VEHICLE

FIXED OBJECT

HEAD ON

REAR END

RAN OFF ROAD

ANGLE

TURNING

BACKING

SIDESWIPE

OUT OF CONTROL

INJURY

FATALITY

9 MPH OR LESS

10 MPH TO 19

20 MPH TO 29

30 MPH TO 39

40 MPH TO 49

50 MPH TO 59

60 MPH TO 69

70 AND UP

SPEED UNKNOWN

P PEDESTRIAN

T TRAIN

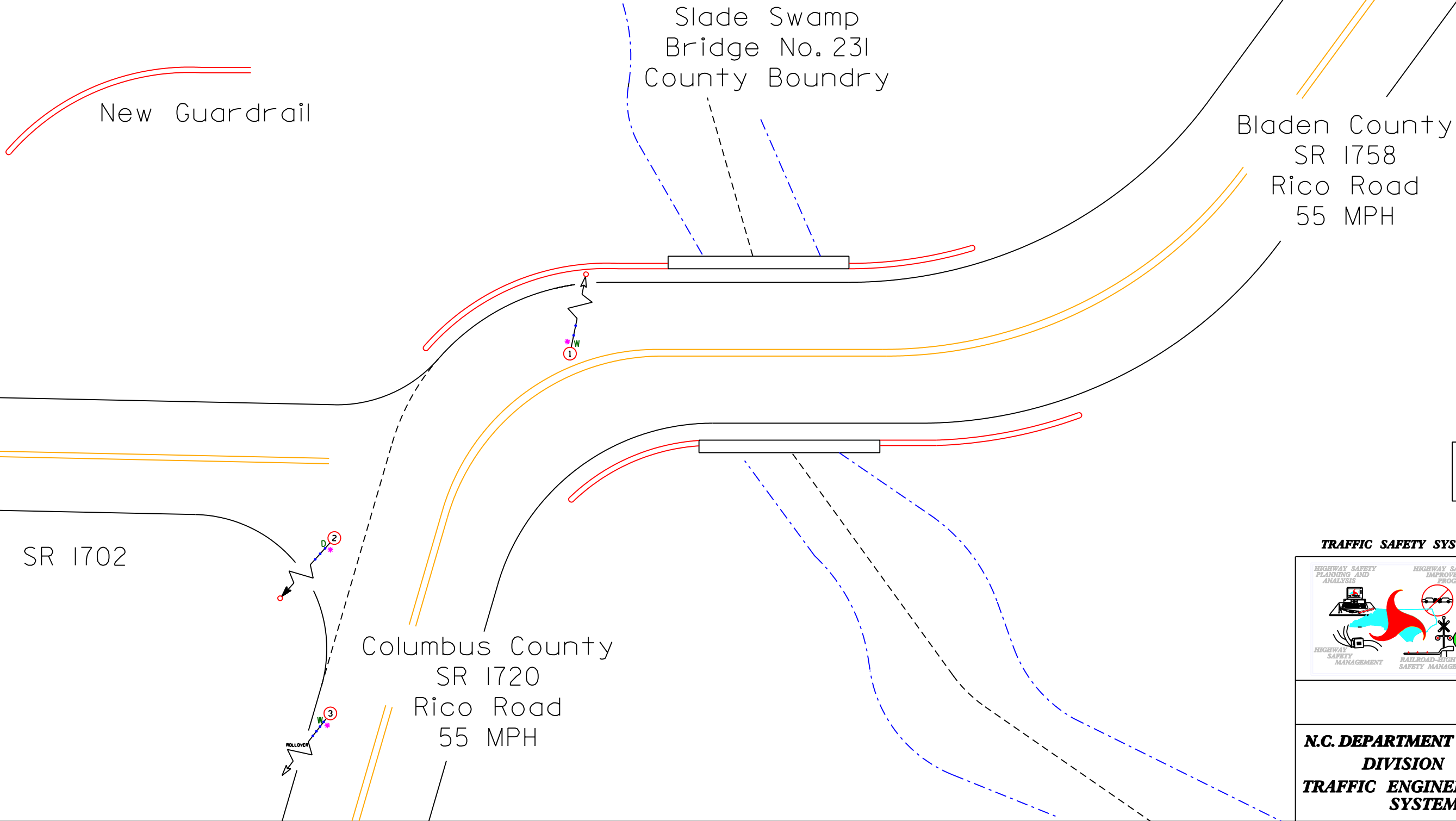
• DRIVER AT FAULT

D DRY

W WET

I ICY OR SNOWY

O OILY



# Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

HIGHWAY SAFETY PLANNING AND ANALYSIS

HIGHWAY SAFETY IMPROVEMENT PROGRAM

RAILROAD-HIGHWAY SAFETY MANAGEMENT

COLLISION DIAGRAM

DIVISION: 6

AREA: 6

STUDY PERIOD: 7/1/2002 TO 4/30/2007

DISTANCE: Y-LINE = 500FT bridge

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